

Gov. Doc.
Can
M



CANADA

III

Mines, Bureau of.

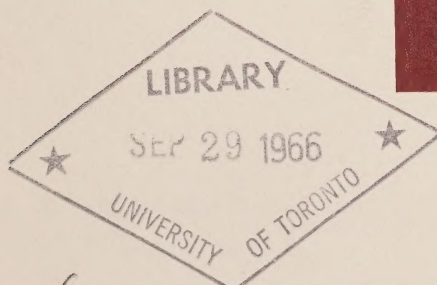
3 1761 12001976 5

(report of the)

EXPLOSIVES DIVISION

Annual report
(calendar years)

1964-65



(DEPARTMENT OF MINES AND TECHNICAL SURVEYS)



CANADA

report of the
**EXPLOSIVES
DIVISION**

calendar years 1964-65

E.J. FRASER
Chief Inspector

©
ROGER DUHAMEL, F.R.S.C.
Queen's Printer and Controller of Stationery
Ottawa, 1966


Cat. No.: M81-1964/65

CONTENTS

Offices and Staff	1
Manufacture	2
Authorization and Testing	2
Imports	3
Licences, Permits and Certificates	3
Inspections	4
Thefts	4
Destruction of Explosives	4
Abandoned Explosives	5
Accidents in Manufacture	5
Accidents in Storage	6

APPENDICES

A. Factories licensed to manufacture explosives	8
B. Explosives imported into Canada	9
C. Accidents: Part I—all types	10
Part II—misuse	14
D. Authorized explosives and manufacturers ..	18



Digitized by the Internet Archive
in 2025 with funding from
University of Toronto

<https://archive.org/details/31761120019765>

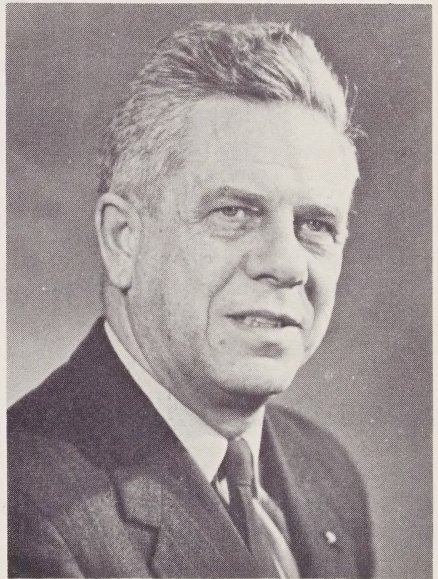
THE EXPLOSIVES DIVISION

Since its inception in 1920 the Explosives Division has been responsible for the administration of the Explosives Act, a statute enacted in the interest of public safety to control the manufacture, authorization, sales, storage, importation and transportation by road of explosives.

offices and staff

In February 1964 Mr. H. P. Kimbell retired on superannuation after twenty years' service with the Division. He joined the staff in 1944 and was appointed Chief Inspector following the retirement of Mr. W. P. Campbell in 1955. Mr. E. J. Fraser was appointed to succeed him as Chief Inspector and Mr. R. P. Quinn assumed the duties of the Assistant Division Chief. Mr. L. C. Lang joined the Division in August 1964 from Iron Ore Company of Canada Schefferville, Que.

The Division's main office is in Ottawa and all licences, permits and certificates are issued from here. Regional inspectors are located at 326 Howe Street, Vancouver, B. C., and Bedford Institute of Oceanography, Dartmouth, N. S.



Henry P. Kimbell

manufacture

The production of commercial blasting explosives in licensed factories increased sharply to 252 million pounds in 1964 and to 290 million pounds in 1965. This is almost double the production of 147 million pounds in 1961. Blasting agents based on ammonium nitrate accounted for most of this increase. However, it is interesting that for the first time since 1957 the production of nitroglycerine dynamites also showed an increase over the previous year and in 1965 dynamite production exceeded 100 million pounds.

Prior to 1957, dynamite was the standard blasting explosive, but it is gradually being replaced, particularly in large open-pit mines, by less sensitive blasting agents based on ammonium nitrate. There is still considerable interest in 'on site' blending of ammonium nitrate and fuel oil and although accurate figures are not available, we estimate that approximately 100 million pounds were mixed in this fashion during the two-year period.

The twenty-seven factories licensed under the Act may be divided into five main categories, depending on the type of operation, as follows:

<u>Type of Operation</u>	<u>Number of Factories</u>	
	<u>1964</u>	<u>1965</u>
Military explosives and pyrotechnics	5	3
Fireworks	4	3
Commercial ammunition	5	5
Blasting explosives for sale	10	11
Blasting explosives for private use	3	4
Total	27	26

The last category includes the 'on site' manufacture of slurry explosives in a mobile unit where the explosives are mixed by a continuous process and pumped directly into the borehole. A list of factories is included in Appendix A.

authorization and testing

The physical and chemical testing of explosives, as required by the Act, is performed in the Explosives Laboratory of the Mines Branch. Samples examined during the period totalled as follows:

Type	Number of Examinations	
	<u>1964</u>	<u>1965</u>
Blasting explosives		
(a) for authorization	8	15
(b) run-of-work	5	10
Small-arms ammunition	16	14
Fireworks	39	46
Blasting accessories	2	9
For other government departments	17	20
Total	87	114

"Other government departments" denotes assistance in assessing the hazards of handling and transporting explosives and other dangerous goods. Such assistance was provided to the Department of National Defence, The National Harbours Board, The Post Office Department as well as the RCMP and other police agencies.

imports

A breakdown of explosives imported by class and division is shown in Appendix B.

licences, permits and certificates

Explosives Regulations Part XIV "Importation of Explosives" was amended to allow increased use of the annual permit for explosives which constitute only a limited hazard. As expected, this greatly reduced the number of permits issued in 1965.

All licences for manufacture, storage, sale, importation and transportation are issued from the Division's main office in Ottawa. The following is a breakdown of these:

	<u>1964</u>	<u>1965</u>
Factory licences	27	26
Magazine licences (storage for sale)	495	500
Temporary magazine licences (storage for private use)	1,124	1,100
Explosives transportation permits	267	335
Explosives importation permits	1,219	692
Ammonium nitrate and fuel oil permissions	30	22

inspections

The following number of inspections were carried out during the two years:

	<u>1964</u>	<u>1965</u>
Factories	50	53
Magazine licences (storage)	2,070	2,269
Trucks (transportation)	119	111

These include inspections carried out by members of the RCMP who are all deputy inspectors of explosives. In addition, approximately 335 inspections were carried out in connection with the storage of explosives in unlicensed premises. The Regulations permit storage for private use up to 150 pounds of dynamite and 2,000 detonators without a licence. Frequently, through carelessness, these small users allow explosives to fall into the hands of children or other unauthorized persons and we are constantly trying to improve the security of these storages.

thefts

There were thirty-two thefts reported in 1964 involving sixteen licensed magazines, eight unlicensed premises and eight magazines under provincial control. Explosives stolen amounted to 6,172 pounds of blasting explosives, 8,141 detonators, 5,000 feet of primacord, 70,000 feet of connecting wire and 300 feet of safety fuse. The fact that eighteen magazines were entered indicated the need for additional security and we have adopted new minimum standards to reduce illegal entries. The installation of burglar alarms on some magazines under certain circumstances was also recommended. These steps have been proved effective, because only twenty-five thefts were reported in 1965 involving twelve licensed magazines, eleven unlicensed premises and two magazines under provincial control. The total explosives stolen in 1965 amounted only to 1,977 pounds of blasting explosives, 6,489 detonators, 1,000 feet of primacord and 1,300 feet of safety fuse.

One theft resulted in an unfortunate accident to an eleven-year-old boy who lost an eye when the detonator he was hacksawing exploded. In another instance, following theft from a magazine in Quebec, police stopped a truck with four adults and four children aboard. The children were sitting on the stolen dynamite in the back of the truck.

destruction of explosives

In 1964 there were seventy-five reports of destruction including 40,000 pounds of blasting explosives, 500 pounds of fireworks and 4,500 detonators; and in 1965, eighty-nine reports including 46,024 pounds of blasting explosives and 41,275 detonators. In 1964, following the grounding of the ship "Pacific Laurel" on a reef, when 531 cases of blasting explosives became watersoaked, 26,550 pounds were destroyed by detonation.

abandoned explosives

In both years, forty-two reports of abandoned explosives were received. The quantity accounted for over 1,800 pounds of blasting explosives, 630 detonators and 1,000 feet of primacord in 1964, compared to 12,040 pounds of blasting explosives and 1,329 detonators in 1965. Many of these were discovered by the public and reported to the police who were able to dispose of the explosives safely. However, in a number of instances, the explosives were found by curious children who were able to discharge the explosives by experimenting with them.

In most cases it is impossible to discover who is responsible for abandoning explosives. However, in some of the above cases, individuals were located and successfully prosecuted.

accidents in manufacture

1964 - 5 minor accidents, 3 minor injuries

1965 - 8 accidents, 2 deaths, 9 injuries

Licensed explosives factories are required to report every unusual occurrence or ignition of explosives no matter how minor. In the five incidents reported in 1964 three persons were slightly injured or suffered from shock.

An explosion in a fireworks factory deserves special mention because although, fortunately, the injuries were minor, they could have been serious or even fatal. Two operators in a building were filling a military store when one of them noticed smoke coming from a carton containing delay fuses which were to be inserted in the store. The operator immediately vacated the premises taking the other girl with her. As they reached the door the explosion occurred, the blast actually heaving them towards the wooden ramp, and safety. It was estimated that five or six seconds elapsed between the appearance of smoke in the carton and the explosion. The quick action of the operator no doubt prevented a more serious accident.

Following a power failure in a trinitrotoluene operation, fumes started to emanate from the separators of the TNT plant and one of the nitrators commenced to boil over. The operator attempting to dump the nitrator received first degree acid burns to his right foot.

At the same plant a fire started in the TNT catch tank area but was put out without injury or serious damage. The cause was believed to have been the use of organic insulation material and this has now been corrected.

A third incident at this plant occurred when there was a detonation in the red water burner outside the TNT building. No one was injured and an investigation indicated accumulation of TNT in the red-water burner. Changes in operation procedure were recommended.

At another plant, in the manufacture of blasting caps, a low-order detonation in the lead styphnate precipitation pot was reported. The operator was taking a sample at the time but was not injured although there was some material damage. The cause was believed to be foreign material, or the operator striking the side of the pot when sampling.

In 1965 an explosion occurred in a dynamite factory which destroyed a mix house, the NG separator house and a large portion of the NG transmission lines. The two mix house operators were killed, and a helper who was unloading TNT from a truck parked nearby was injured. Investigation of the accident failed to indicate what set off the detonation but several possible causes were taken into consideration when planning replacement of the building.

In the manufacture of smokeless powder, an employee was badly burned in the face, chest and legs, as a result of an explosion and fire in a mixer. The accident was caused by lack of training and supervision.

A fire which occurred during the manufacture of a blasting agent could have been more serious in consequences. However, the sprinkler system was most effective and went into immediate action.

accidents in storage

On 11 September 1964 an underground magazine in a tunnel containing approximately twenty-five cases of dynamite exploded killing three men and injuring two. The accident occurred during the lunch hour when most of the employees were on surface; otherwise the number of casualties would have been much greater. The explosives were stored in an unlined rock-cut with a locked door and the explosion was thought to have been caused by a fall of rock from above. A thorough investigation was carried out and recommendations made calling for offset recesses in the rock and substantial lining and cribbing of the recess.

A large storage of detonators in a licensed magazine in Alberta exploded as the result of a fire believed started by trespassers. There were no injuries but considerable damage. A nearby magazine containing dynamite fortunately was not affected.

There were two instances of isolated magazines blowing up in British Columbia. The cause of these explosions was not definitely established but it is believed that they were set off by rifle fire. Both buildings were of fairly substantial construction, which indicates the vulnerability of the average magazine to a high-powered bullet.

APPENDICES

appendix A

FACTORIES LICENSED TO MANUFACTURE EXPLOSIVES, 1964-1965

Owner	Location of Factory	General Nature of Product
W.F. Bishop & Son Limited	Unionville, Ont.	Fireworks
Canadian Arsenals Limited	St. Paul l'Ermite, Que.	Military ammunition
Canadian Arsenals Limited	Valcartier, Que.	Military ammunition
Canadian Arsenals Limited	Nitro, Que.	Military explosives
Canadian Bristol Aerojet Limited	Rockwood, Man.	Propellants
Canadian Industries Limited	Beloeil, Que.	Blasting explosives, fuse powders, nitro-compounds
Canadian Industries Limited	Brainerd, Man.	Blasting explosives
Canadian Industries Limited	Brownsburg, Que.	Ammunition, detonators, blasting accessories, pyrotechnic signals
Canadian Industries Limited	Calgary, Alta.	Blasting explosives
Canadian Industries Limited	James Island, B.C.	Blasting explosives
Canadian Industries Limited	Nitro, Que.	Military explosives
Canadian Industries Limited	Nobel, Ont.	Blasting explosives
Canadian Industries Limited	Sept. Isles, Que.	Blasting explosives
Canadian Industries Limited	Sudbury, Ont.	Blasting explosives
Canadian Safety Fuse Company Limited	Brownsburg, Que.	Safety fuse, detonating fuse, blasting accessories
Consolidated Mining and Smelting Company of Canada Limited	Kimberley, B.C.	Blasting explosives
Cyanamid of Canada Limited	Niagara Falls, Ont.	Nitroguanidine
Delta Explosives Limited	St. Joseph du Lac, Que.	Blasting explosives
DuPont of Canada Limited	North Bay, Ont.	Blasting explosives
Gevelot of Canada Limited	Saskatoon, Sask.	Ammunition
Hand Chemical Industries Limited	Cooksville, Ont.	Fireworks and military pyrotechnics
Hand Chemical Industries Limited	Papineauville, Que.	Fireworks and military pyrotechnics
Ireco of Canada, Ltd.	Gagnon, Que.	Blasting explosives
Iron Ore Company of Canada	Schefferville, Que.	Blasting explosives
Iron Ore Company of Canada	Wabush Lake, Nfld.	Blasting explosives
Remington Arms of Canada Limited	Long Branch, Ont.	Ammunition
Universal Pyrotechnics	Orangeville, Ont.	Highway fusees
Winchester-Western (Canada) Limited	Cobourg, Ont.	Ammunition
XL Explosives Limited	Hawkesbury, Ont.	Ammunition

appendix B

EXPLOSIVES IMPORTED INTO CANADA, 1964-1965

Class	Division	Description	1964	1965
I	.....	Gunpowder	58,965 lb	61,120 lb
II	.....	Nitrate mixtures	500 lb	20,000 lb
		Nitrate mixtures (slurry)	300,000 lb	310,350 lb
III	.....	Nitro-compounds -		
	1 and 2	Blasting explosives	500 lb	1,591 lb
	2	Propellants	103,924 lb	80,682 lb
	2	For use in explosives factories	1,163,902 lb	2,491,563 lb
VI	1	Primers	5,949,393 units	63,353,227 units
	1	Safety fuse	433,000 feet	371,700 feet
	2	Detonating fuse	308,540 feet	466,500 feet
	2	Seismic explosives	348,453 lb	56,447 lb
	3	Detonators	855,224 units	210,336 units
VII	2	Manufactured fireworks	1,144,818 lb	1,764,445 lb
		Miscellaneous	96,752 lb	62,514 lb

Since annual rather than individual importation permits are now issued for safety cartridges, and nitrocellulose for paints and lacquers, these items are not shown in the table as we do not have accurate importation figures.

PART I - ACCIDENTS INVOLVING EXPLOSIVES, 1964

Circumstances or Cause	Mines and Quarries			Elsewhere			Total	
	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Injured
In Use								
a Delaying too long at face of blast	6	3	7				6	7
b Premature firing of electrical blast								
c Not taking proper cover	16	3	15					
d Projected debris	1	1	-	2	-	2	18	17
e Returning too soon to blasting site	2	2	1	1	-	1	2	1
f Improper handling of misfires	1		1				1	1
g Rough tamping	1		2				1	2
h Ignition of explosives by flames, sparks, etc.								
i Drilling into explosives	10	1	13				10	13
j Striking unexploded charge in removing debris								
k Preparing charges								
l Using too short a fuse								
m Insufficient ventilation after blasting	1		1				1	1
n Springing shots	6	1	6	1		1	7	7
o Inadequate guarding								
p Various	5	1	5				5	5
Total	49	12	51	4	-	4	53*	12 55

PART I - ACCIDENTS INVOLVING EXPLOSIVES, 1964 (cont'd)

Circumstances or Cause	Mines and Quarries		Elsewhere		Total	
	Accidents	Killed	Injured	Accidents	Killed	Injured
In Manufacturing				4		5
In Storage				1	3	4
In Transportation (by road)				-	-	-
Total				5	3	9
In Misuse						
a Detonators				8	-	10
b Other explosives				2	-	2
c Fireworks				2	-	2
d Home-made explosives				3	2	4
Total				15	2	18
Miscellaneous				2	1	2
Total, all circumstances				75	18	84

*These accidents occurred in circumstances not directly controlled by the Act.

PART I (cont'd) - ACCIDENTS INVOLVING EXPLOSIVES, 1965

Circumstances or Cause	Mines and Quarries			Elsewhere			Total	
	Accidents	Killed	Injured	Accidents	Killed	Injured	Accidents	Injured
In Use								
a Delaying too long at face of blast	3	1	3				3	3
b Premature firing of electrical blast							1	
c Not taking proper cover	4	1	4	3	-	3	7	7
d Projected debris				3	1	2	3	2
e Returning too soon to blasting site	3	-	3	1	1	-	4	3
f Improper handling of misfires	3	-	4				3	4
g Rough tamping	1	-	2	1	1	-	2	2
h Ignition of explosives by flames, sparks, etc.								
i Drilling into explosives	12	2	20	2	-	3	14	23
j Striking unexploded charge in removing debris	1	-	1	1	-	1	2	2
k Preparing charges	2	-	3				2	3
l Using too short a fuse								
m Insufficient ventilation after blasting	1	-	1				1	1
n Springing shots	1	-	1				1	1
o Inadequate guarding	2	-	2				2	2
p Various	5	-	5	2	1	2	7	7
Total	38	4	49	13	4	11	51*	60

PART I (cont'd) - ACCIDENTS INVOLVING EXPLOSIVES, 1965

Circumstances or Cause	Mines and Quarries		Elsewhere		Total	
	Accidents	Killed Injured	Accidents	Killed Injured	Accidents	Killed Injured
In Manufacturing						
In Storage						
In Transportation (by road)						
Total						
In Misuse						
a Detonators						
b Other explosives						
c Fireworks						
d Home-made explosives						
Total						
Miscellaneous						
Total, all circumstances						

*These accidents occurred in circumstances not directly controlled by the Act.

appendix C

PART II - MISUSE OF EXPLOSIVES

Ref. No.	Résumé of Typical Accidents	Killed	Injured
<u>(a) Detonators</u>			
1-3	A 10-year old boy lost part of his thumb, fore-finger and middle finger of his left hand when he exploded a detonator by striking it with a rock. The detonator was one of several he obtained in an old barn, and the owner was unaware these were on his premises.		1
1-8	A 10-year old boy suffered the loss of three fingers from one hand and two from the other when a detonator he was heating with a flame exploded. Three juveniles found 10 detonators at a local garbage dump.		1
1-5	A 13-year old boy lost the end of three fingers when he exploded a detonator. He and a companion stole the detonators from an unlocked farm shed. The owner was prosecuted.		1
1-4	A 9-year old boy sustained superficial damage to his hands and right thigh when he exploded a detonator by striking it with a rock. His 8-year old companion had entered a warehouse through a rear window and stolen four detonators.		1
1-9	A 14-year old youth suffered severe injuries to his left hand when he exploded a detonator with an electric current. His younger brother had found detonators and dynamite at an excavation site.		1
2-8	Two brothers, aged 7 and 5 years, sustained minor injuries when they placed a detonator in a vice and sawed through it with a hack saw, and it detonated. The children had found the detonator on the floor in the pump house of an unoccupied farm house.		2

PART II - MISUSE OF EXPLOSIVES (cont'd)

<u>Ref. No.</u>	<u>Résumé of Typical Accidents</u>	<u>Killed</u>	<u>Injured</u>
<u>(a) Detonators (cont'd)</u>			
1-10	An 11-year old boy lost the sight of his left eye when he put a detonator in a bench-vice and sawed through it with a hack saw, and it exploded. The detonator was one of two he and a friend had obtained by forced entry into unlicensed premises.		1
2-4	Two young girls, aged 10 and 8 years, sustained serious eye injuries and multiple cuts and scratches when a 'little tin box' apparently containing blasting caps exploded. The girls are reported to have entered a basement and the detonation occurred when the box was dropped.		2
<u>(b) Other Explosives</u>			
1-6	A 14-year old boy held a .22 cartridge over a match to see what would happen, and lost the sight of his right eye when it exploded.		1
2-6	A 5-year old boy was hit in the right eye by a piece of .22 shell which exploded in a burning trash can.		1
<u>(c) Fireworks</u>			
2-10	A young boy was treated for burns to his back when a teenager hurled a lighted firecracker and it dropped inside his clothes and exploded.		1
3-10	A 9-year old girl was burned on the neck when a firecracker exploded near her face.		1
<u>(d) Home-made Explosives</u>			
3-4	A 19-year old youth was killed by the explosion of a home-made bomb prepared by packing an explosive mixture into a length of 8-inch pipe. The explosion occurred while he was screwing the cap on one end. His 19-year old companion sustained minor injuries.	1	1



—courtesy of The Toronto Telegram

A group of Toronto boys was struck by flying metal debris when a homemade rocket exploded. The boy in the top picture suffered serious injuries to the hand; the other boy, to the eye and shoulder.



PART II - MISUSE OF EXPLOSIVES (cont'd)

Ref. No.	Resume of Typical Accidents	Killed	Injured
<u>(d) Home-made Explosives (cont'd)</u>			
1-11	A 17-year old youth lost his right thumb, the tips of all fingers on the right hand, and had his left thumb broken, when a bomb he had prepared exploded as he was tamping the explosives ingredients into a steel pipe.		1
2-5	An 18-year old youth was killed, another 18-year old critically injured and a 17-year old suffered minor injuries when a home-made bomb exploded. They had packed the explosives mixture into a length of 6" pipe and the explosion occurred while they were plugging the ends.	1	2
<u>(e) Miscellaneous</u>			
3-8	The pilot and sole occupant of an aircraft was killed when an explosion took place in the aircraft due to the apparent detonation of a stick of dynamite, as he was transporting explosives without authority.	1	
1-7	A 6-year old boy was seriously burned and his 5-year old brother sustained burns of a lesser degree when a military grenade they found while playing in a creek exploded.		2

appendix D

AUTHORIZED EXPLOSIVES

Manufactured in Canada

Canadian Arsenals Limited, Ottawa, Ont.
Military explosives

Canadian Bristol Aerojet Limited, Winnipeg, Man.
Solid propellant motors

Canadian Industries Limited, McMasterville, Quebec
B. L. 182
Pro-core primers

Canadian Industries Limited, Montreal, Que.
Detonators, electric detonators and squibs
Delay switch
Dextrinated lead azide
Heater cartridge
Highway flares
Igniter cord electric starter
Lead styphnate
Marine flares
MS detonating relay
Percussion caps
Railway fusees
Railway track signals
Safety cartridges
Styphnic acid
'Sureshot' boosters
Tetrazene

Amex and Amex II

Amite

Ammonia dynamite - 20, 25, 30, 35, 40, 50 and 60 per cent
Ammonia dynamite, agricultural - 60 per cent (for export only)
Ammonia dynamite extra - 40, 50, 60 and 70 per cent (for export only)
Ammonia dynamite, free running - 40 and 65 per cent
Ammonia dynamite, high density - 20, 25, 30, 35, 40, 50 and 60 per cent (for export only)
Ammonia dynamite, low density - 20, 25, 30, 35, 40, 50, 55 and 60 per cent (for export only)
Ammonia dynamite, quarrying - 60 per cent
Ammonia dynamite, seismograph - 60 per cent (for export only)
Ammonia dynamite, stumping - 20 per cent (for export only)
Ammonia gelatin - 30, 40, 50, 60, 65, 75, 80 and 90 per cent (for export only)

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured in Canada (cont'd)

Canadian Industries Limited, Montreal, Que. (cont'd)

Belite A and B - 60 per cent
 Black blasting powder
 Blastol - 60 per cent
 BRX-7 - 75 per cent
 Cilgel-B and Cilgel-C - 70 per cent
 C-I-L- Dynamite No. 3
 C-X-L-ite
 Detonating fuse primer
 C-I-L Ditching Dynamite and ditching dynamite (export)
 Dygel - 75 per cent
 Dynamex - 40, 50, 60 and 70 per cent
 Exel-G, Exel-S and Exel-GW - 75 per cent
 Explosives BL-100, BL-112, BL-114, BL-115, BL-116, BL-125, BL-132, BL-134, BL-135, BL-144, BL-146, BL-147, BL-148, BL-151, BL-152, BL-156, BL-164, BL-165, BL-166, BL-167, BL-168 and BL-170
 Forcite - 30, 40, 50, 60, 75, 80, 85 and 90 per cent
 Fuse powders - 35, 40, 44, 53 and 65 seconds
 Gelatin dough - 90 per cent
 Geogel - 60 per cent
 Giant gelatin - 25, 30, 35, 40, 50, 60, 75, 80 and 90 per cent
 Guhr dynamite
 Guncotton
 Gunpowder
 Hi-velocity gelatin - 60 per cent
 Hydromex, Hydromex M2, M4 and M8
 Liquid nitroglycerine
 Loshok - 20 per cent
 Monobel - Nos. 4, 7, 14 and X (EQ. S.)
 Nitrocotton
 Nitrone - S-1, T-1, T-3, T-4, S-M and SM Super
 Nitrone quarry primer and nitrone S-1 primer
 Nitropel
 Nitrox
 Pentaerythritol tetranitrate
 Polar stumping powder - 20 per cent
 Primers - Pentolite, Pento-Mex I, II and III, and Pento-Mite A, B and C
 Primate - 70 per cent
 Pyromex - 60 and 70 per cent
 Seismic gelatin - 60 per cent (for export only)
 Semi-gelatin Nos. 1, 2, 3, 4 and 5 (for export only)
 Shearex - 75 per cent
 S-M booster
 S. N. G.

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured in Canada (cont'd)

Canadian Industries Limited, Montreal, Que. (cont'd)

Stopeite - 25, 30, 35, 40, 45, 55, 65 and 70 per cent

Straight gelatin - 25, 30, 35, 40, 50, 60, 75, 80 and 90 per cent (for export only)

Submagel - 40, 50, 60, 75, 80 and 95 per cent

Trinitrotoluene

Vibrex - 60 per cent

Xactex - 75 per cent

Canadian Safety Fuse Company Limited, Brownsburg, Quebec

Detonating fuse

Hot wire fuse lighters

Ignitor cord - 'Thermalite' brand

Ignitor cord connectors - 'Thermalite' brand

Safety fuse

Consolidated Mining and Smelting Co. of Canada Ltd., Kimberley, B. C.

Mining explosives

Cyanamid of Canada Limited, Niagara Falls, Ont.

Nitroguanidine

Delta Explosives Limited, St. Joseph du Lac, Que.

Delgel '100', '120', '140', '400' and 'S-2'

Deltite

Deltex

DuPont of Canada Limited, Montreal, Que.

DuPont Ditching Dynamite

DuPont Extra Nos. 1, 2, 3, 4 and 5

DuPont Gelatin - 25, 40, 50, 60 and 75 per cent

DuPont Stumping Dynamite

Energex - 40, 50 and 60 per cent

Energex FR - 25, 40 and 65 per cent

Gelex-A - 1, 2, 3, 4 and 5

Gypsal Nos. 1 and 2

Hi-Cap 1, 2 and 3

Hi-Det Primer

Hi-velocity gelatin - 40, 60 and 75 per cent

NBL-101, NBL-102, NBL-103, NBL-104, NBL-201, NBL-301, NBL-302, NBL-304,

NBL-307, NBL-309, NBL-402, NBL-404 and NBL-407

Nilite FR and 310

Nitramite and Nitramite FR

Nitramon primers

Pelletol Nos. 1 and 2

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured in Canada (cont'd)

DuPont of Canada Limited, Montreal, Que.

Pentolite primer

Seismex - 40 per cent

Seismogel - 60 per cent

Seismograph 'hi-velocity' - 60 per cent

Semi-gelatin No. 1

Special gelatin - 30, 35, 40, 50, 60, 75, 80 and 90 per cent

Submarine hi-velocity gelatin - 60 and 80 per cent

Super 'Tovex' Gel

Tovex, Tovex A-2 and A-4

'Trimtex'

Gevelot of Canada Limited, Saskatoon, Sask.

Safety cartridges

Iron Ore Company of Canada, Sept Iles, Que.

Mining explosives

Slurry explosives

Remington Arms of Canada Limited, Toronto, Ont.

Safety cartridges

Winchester-Western (Canada) Limited, Cobourg, Ont.

Safety cartridges

XL Explosives Limited, Hawkesbury, Ont.

Safety cartridges

Pursuant to Section 8 of the Explosives Act, ammonium nitrate blended with fuel oil is an authorized explosive.

Manufactured by Foreign Firms

Aktiebolaget Bofors, Nobelkrut, Bofors, Sweden

Smokeless sporting powder

Detonating fuse (Bofors type)

American Cyanamid Co., Latrobe, Pa.

Fulminate of mercury

Detonators

Apache Rescue Co. Inc., Minneapolis, Minn.

Signal cartridges

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

Asahi Chemical Company, Osaka, Japan

Ammonia gelatin dynamite - 40 per cent

Semi-gelatin dynamite No. 3

Electric detonators

Safety fuse

Atlas Chemical Industries Inc. , Wilmington, Del.

Atlas Aquatol

Atlas Gelatin - 60 and 75 per cent

Atlas RXL - 185 and 198

Detonators

Giant Gelatin - 40, 60 and 75 per cent

Giant Gelatin, hi-velocity - 60 per cent

Shaped charges

Subgel A

Atlas Diesel Co. , Stockholm, Sweden

Engine starting cartridges

Austin Powder Co. , Cleveland, Ohio

Ammonia dynamite - Al-4 and 60 per cent

Apcomite 20-A

Austinite Nos. 15, 20 and 21

Black pellet powder

Detonating fuse

Primers - pentolite, ANP-16 amatol and ANP-16 sodium amatol

Baschieri and Pellagri, Bologna, Italy

Smokeless powder

Leon Beaux & Co. , Societa Italiana Munizioni, Milan, Italy

Safety cartridges

Messrs. Germano Benzomi, Bergamo, Italy

Safety cartridges

Bermite Powder Co. , Saugus, Cal.

Baker Power Charge

Firing head igniter

Bombrini Parodi-Delfino, Rome, Italy

Safety Cartridges

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

Brock's Crystal Palace Fireworks Limited, Hemel Hempstead, Herts., England
Bird scaring cartridges

Cardox Corporation, Chicago, Ill.
Cardox
Cardox Heaters

Cartoucherie Française, Paris, France
Primers and primed cases
Safety cartridges
Smokeless powder

Cascade Cartridge Co., Lewiston, Idaho
Primers

Deutzer Bolzensetzer Company, Germany
Stud driving cartridges

Dow Chemical Co., Virginia, Minn.
Dow MS-80 series of metallized slurry explosives

E. I. DuPont de Nemours & Company, Inc., Wilmington, Del.
Auxiliary charges C. 63
Black fuse powder
Composition B
Delay assembly 'Ledcore'
Detonators and electric detonators
DuPont Bulk Powder
DuPont Ditching - 50 per cent
DuPont Extra - A, C, E, F and G
DuPont Gelatin - 25, 40, 50, 60 and 75 per cent
Elcord Delay Unit
Explosive rivets
Fulminate of mercury
Gelex - Nos. 1, 2 and 3
Hi-velocity gelatin - 40, 60 and 75 per cent
Jet tappers
NBL-308
Nilite 101 and 202
Nitramon - A, 2 and S
Nitramon primer and Nitramon S primer
Nitramex - 2 and 2 H
Nitramite
Nitramite primer

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

E. I. DuPont de Nemours & Company, Inc., Wilmington, Del. (cont'd)

Nitrocellulose
 Nitrostarch
 Oil well explosives S. O. W. E. No. 1 and EL-431-A
 P. 6 seismograph booster
 Pelletol Nos. 1 and 2
 Pentaerythritol tetranitrate
 Plastic primer
 'Primacord' booster
 'Primacord' MS connector
 Primer HDP-1, HDP-2 and HDP-3
 Red Cross Extra - 40, 50 and 60 per cent
 Red Cross Extra (H. W. R.) - 40, 50 and 60 per cent
 'Rock breaker' pellets
 Shaped charges
 Sheet explosive EL-506A
 Smokeless powders
 Special gelatin - 30, 40, 50, 60, 75, 80 and 90 per cent
 Special primer with booster (4 x 7.5 lb.)
 Submarine hi-velocity gelatin - 60 and 80 per cent
 Tetryl
 Waterproof booster C. 66

Dynamit Nobel AG, Troisdorf, Germany

Delay connector
 Detonators and electric detonators
 Detonating fuse 'Nobel Cord'
 Dinitrotoluene
 Primers and percussion caps
 Safety cartridges
 Smokeless powder
 Trinitrotoluene

Ellefsens Tendskruefabrikk, Stokke, Norway

Time fuses and detonators for whaling guns

EM-GE Sportgerate K-G Gerstenberger & Co., Wurttemberg, Germany

Blank cartridges

Ensign Bickford Company, Simsbury, Conn.

Detonating fuse
 Flexible linear shaped charge
 Ignitacord
 Igniter cup

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

Ensign Bickford Company, Simsbury, Conn. (cont'd)

- Lead spitter
- Low energy detonating cord
- Pull-wire safety fuse lighter
- Quarrycord

Fabwerke Hoechst AG., Frankfurt, West Germany

- Dinitrotoluene

Farbenfabriken Bayer A. G., Leverkusen, West Germany

- Dinitrotoluene

Federal Cartridge Corporation, Minneapolis, Minn.

- Safety cartridges
- Ampact power tool cartridges

Federal Laboratories, Pittsburgh, Pa.,

- Lachrymatory cartridges
- Powder loads

Gevelot, S. A., 50 Rue Ampere, Paris, France

- Safety cartridges

Giullio Fiocchi, Lecco, Italy

- Power tool cartridges
- Primers and percussion caps
- Safety cartridges

Go Oil Well Services Inc., Fort Worth, Texas

- Jet perforators

Greenwood & Batley Ltd., Leeds, England

- Safety cartridges

Gustav Genschow & Co., A. G., Hamburg, Germany

- Safety cartridges

Haerens Ammunition Arsenals, Denmark

- Safety cartridges

Haerens Krudtvaerk Frederikavaerk, Denmark

- Safety cartridges

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

Hercules Powder Company, Wilmington, Del.

- Detonators and electric detonators
- Gelatin oil well explosive
- Explosive E. P. 172-1 and 2
- Gelamite D
- Gelatin Extra - 40 and 60 per cent
- High pressure gelatin - 60 per cent
- Nitrocellulose
- Smokeless powder
- Titan Booster 20
- Vibro caps
- Vibrogel B and 3
- Vibronite B

Hirtenberger Patronen, A. G. , Hirtenberg, Austria

- Primers and primed cases
- Safety cartridges

Holex Inc. , Holister, Calif.

- Holex Explosive Bolts
- E. B. Caps
- Initiator assemblies
- Guillotine Cable Cutters

Hull Cartridge Co. , Hull, Yorkshire, England

- Safety cartridges

Imperial Chemical Industries Limited, England

- Black powder
- Cerium low tension fusehead
- Detonating relay
- Detonators and electric detonators
- Gunpowder
- Pentaerythritol tetranitrate
- Percussion caps
- Safety cartridges
- Smokeless powders
- Tetryl
- Nitrocellulose

Ireco Chemicals, Salt Lake City, Utah, U. S. A.

- D. B. A. slurry explosives

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

Interarmco, Alexandria, Virginia
Safety cartridges

Intermountain Research & Engineering Co. Inc., Salt Lake City, Utah
Procore 3C Booster

Jet Guns Company, Fort Worth, Texas
Shaped charges
Glass gun perforating charges - G. G. 2, G. G. 4 and G. G. 7

K. & G. Oil Tool & Service Co. Inc., Houston, Texas
Junk shot

King Powder Co., Cincinnati, Ohio
Black pellet powder

J. C. Kinley Co., Houston, Texas
Shells - P #51, P #70 and P #100
Kinley Sand Line Cutter

Lake Erie Chemical Co., Cleveland, Ohio
Lachrymatory cartridges

Lane-Wells Co., Houston, Texas
Gun perforator cartridges

Lapua Cartridge Factory, Lapua, Finland
Industrial cartridges
Safety cartridges

Mecca Cable and Service Inc., Houston, Texas
Magniset cartridges

Mid Continent Torpedo Co. Ltd., Tulsa, Okla.
Red Head Firing Heads

Nitroglycerin Aktiebolaget, Gyttrorp, Sweden
Safety cartridges

Omnipol Ltd., Prague, Czechoslovakia
Safety cartridges

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

Olin Mathieson Chemical Corp. , East Alton, Ill.

Cyclonite
 Detonators and electric detonators
 Kiln gun shells
 Lineman's flare lights
 Normal lead styphnate
 Railway fusees
 Railway torpedoes
 Safety cartridges, Western and Winchester
 Smokeless powder
 'Tempotool' cartridges

Österreichische Jagdpatronenfabrik, Vienna, Austria

Safety cartridges

Oy Sako, AB, Finland

Safety cartridges

T. Page-Wood Limited, Bristol, England

Safety cartridges

Pains-Wessex Limited, High Post, Salisbury, Wilts. , England

Bird scaring cartridges

Patronenfabrik, A. G. , Solothurn, Switzerland

Safety cartridges

Pawam-Pionki, Warsaw, Poland

Safety cartridges

Penguin Associates Inc. , Malvern, Pennsylvania, U. S. A.

Bird scaring cartridges

Perforating Gun Atlas Corporation, Houston, Texas

Jet perforating charges

Petroleum Tool Research Inc. , Fort Worth, Texas

Detonator assembly
 Vibro-Shot Charge assembly

Poudreries Nationales, France

D-2 propellant powder

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

Poudreries Réunies de Belgique S. A. , Brussels, Belgium
Trinitrotoluene

Poudreries Royale De Wetteren 'Cooppal & Cie. S. A. ', Brussels, Belgium
Nitrocellulose
Safety cartridges

Povazska Strojarne (Kovo Ltd.) Bystrica, Czechoslovakia
Safety cartridges

Pringle Powder Company, Bradford, Pa.
Liquid nitroglycerin

A. B. Norma Projektilfabrik, Amotfors, Sweden
Safety cartridges

Pyrodynamics Incorporated, Malvern, Penn.
Bird scaring cartridges

Remington Arms Co. Inc. , Bridgeport, Conn.
Safety cartridges - Remington, Peters and Springfield
Stud driver cartridges

Rey Frères, Paris, France
Detonators and electric detonators
Detonating fuse - plastex and duplex
Safety cartridges
Safety fuse TT, TR

F. J. Roberts Squib Company, Punxsutawney, Pa.
Miner's Safety Squibs

Rohm-Gesellschaft, Sontheim/Brenz, Kreis Heidenheim, Germany
Blank cartridges
Signal cartridges

Schaffler & Co. , Vienna, Austria
Electric detonators

Karl Schermer and Co. , Karlsruhe, West Germany
Animal stunner cartridges

Stabilimenti Guiseppe Negrelle, Este Padeva, Italy
Primed cartridge cases

AUTHORIZED EXPLOSIVES (cont'd)

Manufactured by Foreign Firms (cont'd)

Standard Railway Fusee Corporation, Boonton, N. J.
Railway torpedoes

Stoneco Inc., Denver, Colorado
Bird scaring cartridges

AB Svenska Metallverken, Vasteras, Sweden
Safety cartridges

Temple Cox Development Co. Ltd., Bromley, Kent, England
Animal stunner cartridges

Trojan Powder Company, Allentown, Pa.
Nitrostarch
Trojan - 40 per cent S, 50 per cent S, ESX, ESX-LD, PT-3X and TL-501-B

Villamossagi Televisio-Radiokeszulekek Cyara, Szekesfehervar, Hungary
Safety cartridges (Hunor brand)

Weatherby's Sporting Goods Co., South Gate, Calif.
Safety cartridges

AUTHORIZED FIREWORKS

Canadian Manufacturers

W. F. Bishop & Son Limited, Toronto, Ont.
Canadian Industries Limited, Montreal, Que.
Canadian Safety Fuse Company Limited, Brownsburg, Que.
Dominion Fireworks Co. Ltd., Dixie, Ont.
Hand Chemical Industries, Cooksville, Ont. and Papineauville, Que.
Universal Pyrotechnics, Orangeville, Ont.

Foreign Manufacturers (certain fireworks authorized*)

Acme Sparkler and Specialty, River Grove, Ill.
American Railway Signal Company, Fostoria, Ohio
Anthes Division Gleason Corp., Fort Madison, Iowa
Astra Fireworks Ltd., London, England
M. Backes' Sons Inc., Wallingford, Conn.

*A list of authorized fireworks is on file in the office of the Explosives Division.
Information may be obtained on request.

AUTHORIZED FIREWORKS (cont'd)

Foreign Manufacturers (cont'd)

E. Benjaminson, Falu Pyrotekniska, Industri, Falun, Sweden
 J. G. W. Berckholtz, Hamburg-Bahrenfeld, Germany
 Hermann Bischoff, Bremen, Germany
 Brock's 'Crystal Palace' Fireworks Ltd., Hemel Hempstead, Herts., England
 Oswald Bradley Ltd., Southport, Lancs., England
 Brookside Pyrotechnic & Chemical Co., Elkton, Md.
 Bryant & May Ltd., London, England
 Contimetal Industry (Hemel Hempstead) Ltd., Hemel Hempstead, Herts., England
 EM-GE Sportgerate K-G Gerstenberger Co., Wurttemberg, Germany
 Erme-Werke, GMBH, Dachau-Munchen, Germany
 Exportvertrieb Pyrotechnik, Hamburg, Germany
 Fenner Associates, San Francisco, California
 Edison Giocattoli, Firenze, Italy
 Genrus Engineering Specialties, W. Los Angeles, California
 Haley & Weller Ltd., London, England
 Thos. Hammond & Company, Craigmillar, Edinburgh, Scotland
 Harvell-Kilgore Corporation, Bolivar, Tenn.
 Hitt Fireworks Company Limited, Seattle, Wash.
 Hudson Fireworks Display Company, Hudson, Ohio
 Illinois Fireworks Co., Danville, Ill.
 Interstate Fireworks Manufacturing and Display Co., Bridgewater, Mass.
 James Pain & Sons Ltd., Eastfield, Mitcham, Surrey, England
 Japan Fireworks Trading Company Ltd., Tokyo, Japan
 Jatina Manufacturing Co. Inc., Mount Vernon, N. Y.
 Keystone Fireworks Manufacturing Co. Inc., Dunbar, Pa.
 Konzum-Zundwarenwerk, Riesa, Germany
 Lakeside Railway Fusee Company, South Beloit, Ill.
 Lenover Corporation, Chester, Pa., and Lenover, Pa. (J. Halpern, Pittsburg, Pa., Distributors)
 Marutamaya Ogatsu Fireworks Co., Tokyo, Japan
 National Fireworks Incorporated, West Hanover, Mass.
 New Jersey Fireworks Mfg. Co. Inc., Elkton, Md.
 Olin Mathieson Chemical Corporation, New Haven, Conn.
 S. V. Olsen, Valby Tingsted, 10 Kobenhavn VBY, Denmark
 Penguin Associates Inc., Devon, Pa.
 N. V. Pyro, Klazienaveen, Holland
 Pyro-Chemie (Hermann Weber & Co.), Eitorf/Sieg, West Germany
 Pyrodynamics Incorporated, Malvern, Pa.
 Pyrotechnischen Fabriken, Wuppertal-Ronsdorf, Germany
 Pyrowerk, Hamburg-Neugraben, Germany
 Reliance Snap Company, Bishop's Stortford, Herts., England
 Richard Appel's Jo King, New York, N. Y.
 Schermuly Pistol Rocket Apparatus Ltd., Newdigate, Surrey, England
 Schiebeler & Co., Hamburg, Germany

AUTHORIZED FIREWORKS (cont'd)

Foreign Manufacturers (cont'd)

Société Pyragric, Rillieux (Ain) Banlieue de Lyon, France
Standard Fireworks Limited, Huddersfield, England
Standard Railway Fusee Corporation, Boonton, N. J.
Stehling and Co., Hamburg, Germany
The J. & E. Stevens Sales Co., New York, N. Y.
Superior Signal Co. Incorporated, South River, N. J.
United Fireworks Manufacturing Company Inc., Dayton, Ohio
U. S. Fish and Wildlife Service, Pocatello, Idaho
Van Karner Chemical Arms Corporation, New York, N. Y.
Messrs. Waeco Ltd., High Post, Salisbury, England
Joseph Wells & Sons Limited, Dartford, Kent, England
Joh. Chr. Wendt, Hamburg, Gr. Borstal, Germany
Wischo-K. G. Wilsker Co., Erlangen, West Germany
Wunderkerzen-Werk Carl Flemming, Hamburg-Neugraben, Germany

Chinese Firecrackers with gunpowder composition, not exceeding 2 inches in length and 1/4 inch in diameter, and small Chinese Fireworks, are authorized when found to function satisfactorily on examination at port of entry.
